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**EFFECTS OF BODY MASS INDEX ON FUNDAMENTAL MOTOR SKILLS AMONG
YAZD S' PUPILS RANGED BY 7-8 YEARS OLD**

ZARE MS*, SADEGHIAN SHAHI MR AND MOLANOURI SHAMSI M

Department of Exercise Physiology, Taft branch, Islamic Azad University, Taft, Yazd, Iran

*Corresponding Author: E Mail: mohammad.s.zare@yahoo.com; Ph.: +98 9128164049

ABSTRACT

The aim of present experiment was to indentifying effect rates of BMI on fundamental Motor Skills among Yazd pupils ranged by 7-8 years old.

Hence, 90 pupils selected by random-cluster, and then their Body Mass Index (BMI) measured by related instruments like as Stadiometer-Model 216 made in South Korea. How running the fundamental motor skills had evaluated by TGMD-2 (2000).

Data analysis by using the test of Pearson correlation coefficient ($P \leq 0.05$) Showed that body mass index had been significantly and positively associated with running ($r = 0.134$) and putting clubs ($r = 0.229$). Furthermore, linear regression test have been shown that body mass index will be able to predict positively changing the skills of running ($R^2 = 0.040$; $\beta = 0.273$; $P = 0.048$), and putting clubs ($R^2 = 0.033$; $\beta = 0.283$; $P = 0.045$).

Based on research, it seems that the effect processing BMI on fundamental motor skills depends on age stages and critical stages of growth in children. Also, we suggest that sports experts and physical educators can be used the BMI as a sensitive variable and inventor factor for measuring the children fundamental motor skills especially control object skills.

Keywords: Fundamental Motor Skills, Body Mass Index, Control Object Skills

INTRODUCTION

As we all remember the inception of sport and physical activity is in forms of childhood plays and continues to the more formal form at school. In fact that is proved by physiological basis in sport extent. Basically for every individual, school is a turning point

in sport. Learning motor skills and their function had always been of a great notice as long as human lived. The human skills from birth to puberty are divided into two parts: fundamental motor skills and complex skills, it is necessary to acquire fundamental and basic skills in order to successfully learn and perform complex skills. Motor skills include general motor skill (throwing, pushing, kicking and etc.) along with special skills pattern leading to a certain goal. These fundamental and basic skills are counted as the base of more developed physical movement which including movement skill, striking, throwing, object control skills and etc.

Also it must be Saied that every complex skill is compound of fundamental motor skills when it is analyzed. In other words this kind of evaluation and skills are influenced by childhood and germinal period changing between low level to the moderate and to the highest level and include observing movement elements and understanding the influential factors such as individual differences, experiencing the movement in their habitant. In other hand developing fundamental motor skills are not spontaneously in every stage of child's growth but they are highly influenced by

factors like physical activity and child's lifestyle.

Most children of 5-7 years old are potentially capable of acquiring fundamental motor skills that are mechanically efficient and harmonic [1]. The stages of life in which children usually develop their motor skills step by step are almost simultaneous with their entrance to the elementary school. For instance, if they crawled correctly when they are infant they can successfully perform fundamental skills as pulling, throwing and kicking later they are able to spontaneously and correctly perform sport skills like Speke, Pass, Shooting. Children improve the motor skills they have learnt through fundamental motor skill's stages and they become ready to acquire more advanced fundamental motor skills [2].

The importance of fundamental and basic skills in children is significant in sport to an extent in which nowadays most of the researchers studied different alternatives in variant situation to identify how to learn these skills positively. For example, Broghani (2009), Hemayat talab (2009), Castbon and Reyvadt (2012), Siak kouchian et al (2011), and Nervik et al (2011) have shown that the component of body composition and the rate of physical activity significantly affect the body's physiological responses and fundamental motor skills. On the other hand,

regarding these influential alternatives, the study on the history and thesis basis of this research shown that body mass index had been used in studying the fundamental motor skills in the last decades. Body mass index equals a person's weight divided by the square of person's height (kg/m²). In the light of the fact that BMI is a fat dependence, most of the epidemiological studies used that as body container index. The main weak point of it is ignoring the probability of the fact that muscle tissues compared with fat tissues might be more contributed into adding weight to the height of the body which means most subject who have larger body mass index actually have more skeletal and muscle mass in comparison with obesity and regard to their height. There is no wonder that obese youth seem taller than other.

It seems that contradictory evidences observed associating the effect of BMI on fundamental motor skills in different ages and genders, for instance Castbon and Rwat (2012) by studying the prevention and remedy of obesity and motor skills on American children of 4-6 years old shown first, the spreading of obesity among children is nearly 15%. second, the relationship between gross motor skills and obesity ,the lower mark achieved by fat pupils in all groups which was a confirmatory to that, finally they announced

that the more weight increases the more learning this skills decreases. But it is not significantly applicable to the alternatives associated with BMI and the decline in delicate skills. Furthermore Siahkoochian had studied the relationship between fundamental motor skills and BMI on children of 7-8years old. They tested 200 boys from Oromie by TGMD-2. The results have shown that fundamental motor skills do have a relationship with the subject's BMI, except in two skills: striking and kicking.

A similar study conducted by Bonvin et al had studied relationship among weight condition, gender and fundamental motor skills.529 children ranged by 2-4 years old had been selected randomly from a kindergarten in Franc [3]. The results shown that regarding the motor skill, boy's performance was better than girl and obese ones got lower mark in all of skills. studying the relationship between fundamental motor skill and BMI on 117 children of 5-7 years old from Belg (60 girl and 57 boy) by using MABC, Hondet et al have shown that obese subject in comparison have lower performance than their co ager. Also they proved that acquisition of such skills has nothing to do with gender .these results counter the research of Nervic et al (2011) about the relationship between BMI and

developing gross skill in children of 3-5 years old. The movement growth scale of 50 American children had been studied and the results have shown that 24% of them were obese or overweight despite it all no relationship between BMI and gross motor skills have not been observed.

These contradictory results indicated the great gap between theory and practice in the extent of BMI effect on fundamental sport through developing fundamental skill. Certainly developing fundamental skills locomotor skill and object control skill such as running, jumping, pushing, throwing, striking and weight shifting skills and so on can facilitate learning and performing of such skills in adulthood, thus it seems that identifying the determinant factors of sport skills in children is of a great necessity for assuring the future of sport in public by improving the quality level of athletic.

The main question, regarding the contradictory evidences in the extent of increasing children motor skills, is: How BMI among all determinant factors and alternatives can affect fundamental motor skills in children? As a matter of fact, which skills are focused in the influential mechanism of these indexes to open new windows of practical science to physical activity designer in low ages? Also regarding the challenges being

suggested there is another question: Which challenges are ahead of children in performing fundamental motor skills (locomotor or controlling object skills) and finally which of them performed better by children of 7-8 years old? The present results can be utilized for better perception of the skills used by children of 7-8 years old in whom they will be able to produce their sport and motor function. To respond the question and the main challenges in the extent of fundamental sport and physical activity in public sport the present research designed in a way that it can identify how BMI affect the fundamental skills in children, likewise it present practical solution for improving fundamental sport.

SUBJECTS AND METHODS

The present research is of a practical semi experienced research with human model; 11000 school s' boys from Yazd ranged by 7-8 years old are the statistical population of the present research. 375 pupils have been selected based on Morgan Table with random cluster sampling, only 90 of them had been selected as subjects by purpose random sampling of the educational area 1 and 2, because the educational department prevented us from having all schools and also head masters, teachers and families prevent the pupils of participating in the study. Thus

after taking the legal license and parents' permission, health forms were filled and 90 students had been selected as subject. Then their BMI were tested in Azad Islamic University Taft branch by related instrument like stadiometer-modol 216 made in South Korea. the subject were asked to wear the least clothes without shoes, stand up, leg adhesive, hands by their sides and their bottom and shoulders connected with stadiometer also they were asked to breathe deeply for their height be measured purely in two times. Likewise they stand on the stadiometer with least clothes for their weight be measured and registered purely. Then their BM was counted by related equations, TGMD-2 was completely performed at schools to evaluate the fundamental motor skills that is standardized for the early stage of life to study the fundamental motor skill function in children of 3 to 10 years old. Furthermore this test only takes 15-20 min for every child which included two factors(the evaluation of locomotors skills and object control skill) each has its specific components [4] present research considered the locomotors skill to be a base for children skills and it's been tested through running test (15 m), galloping (25 m), skipping (5 m with both dominant foot and the other one), jumping (both legs at the same time), leaping

(jump with one leg and land with the other), and sliding (8 m). on the other hand object controlling skill evaluated by putting clubs (with soft ball, plastic clubs, 10 cm T leg), dribbling (with basketball), striking (a plastic ball with 5m distance), kicking (with pigskin from 9 m distance), throw a ball over hand (tennis ball from 5m distance) and under arm roll (with tennis ball). Thus activity protocol had been divided into 12 skills with two basic factors. Each test explained and presented as sample by movement behavior science expert and then each subject perform the related skills.

The Smirnov-Kolmogorov statistical method used for data analysis and for natural disturbance of marks, the Pearson correlation coefficient and linear regression also used for studying the among research's alternatives through SPSS-20 in a significant level of $P < 0.05$.

RESULTS

As previously mentioned, the research subjects were 90 pupils of 7-8 years old (with the average age of 7.047 years old) in Yazd that the alternatives of their body mass index and fundamental skills, regarding to the purpose of this research, have been evaluated. Thus the amount of pupil's BMI each of the fundamental skills shown in table 2 and 1 before any thesis test.

The descriptive results have shown that skipping with the average of 3.50 is the best skill among the locomotor skills being performed by the subjects. On the other hand leaping with the average of 2.31 is the worst among them. The opposite side is the descriptive results of object control skills in which putting clubs and kicking have been the best and striking was the worst skill performed by subjects. The general descriptive results of fundamental movement skill have shown that the 7-8 years old pupils of Yazd city were able to do locomotor skill better.

Before the theories of research being tested, Smirnov-Kolmogorov test showed that alternatives as BMI ($Z=0.92$), running skill ($Z=1.58$), galloping ($Z=1.78$), skipping ($Z=1.60$), jumping ($Z=1.66$), leaping ($Z=1.61$), sliding ($Z=1.80$), putting clubs ($Z=2.47$), dribbling ($Z=1.87$), striking ($Z=1.58$), kicking ($Z=1.04$), and throwing ball overhand ($Z=1.99$) and under arm roll ($Z=1.63$) have disturbed naturally and parametric test are needed to perform the test.

Therefore, first the Pearson correlation coefficient utilized to test the research theories. In addition it provided other deduction about the relationship and internal correlation of BMI and fundamental motor

skill. In other words this extracted information can lead researchers to identifying the internal correlation of the phenomenon. Based on this facts, the Pearson correlation coefficient results shown a significant correlation among BMI and running skill and putting clubs. Likewise it proved the internal correlation of running with galloping and sliding, galloping with skipping and jumping, leaping with jumping and sliding among locomotor skills. Also it has shown that among object control skill: putting clubs with dribbling, dribbling with throwing ball overhand and striking with under arm roll has internal correlation with each other. Thus the results have shown that galloping and skipping have the most internal correlation among locomotor skills and among control object skill dribbling and throwing ball overhand have the strongest internal correlation with each other.

In regard to the significant correlation of BMI and the above skill, predicting the level of BMI changes in relation with running skills and putting clubs seems to be necessary. So the linear regression test can be used to measure variance changes and to calculate the predictability of research alternatives. In light of this sort of interpretations and conclusive results in this extent, the BMI considered to be a predictor and running and putting clubs

as a criteria entered into the regression model .the results shown that the BMI model effect on running skill only justify 3.2 of the total changes and the rest contributed to the other alternatives have not been entered in it ($r^2=0.032$). The results of linear regression test showed that the BMI significantly affect the running skill (as a locomotors skill). Thus its changes in children of 7-8 years old almost can be observed by the BMI changes (table 3). This results observed when the linear regression findings showed the BMI effect on running skill ($r^2=0.033$). In the other words, regard the results of table 3, a significant amount of BMI equals 0.045.

Thus the thesis of $B=0$ (x_1 coefficient) can be refused in a significant level of 0.05 and we can say that the BMI is effective in predicting the rate of putting clubs. Likewise the standardized coefficient regression in this model shown the BMI effects on putting clubs are weak but it is positive. Generally, both linear regression test and Pearson correlation coefficient shown significantly that the BMI has better and more relationship with object control skill particularly putting clubs and indirectly can have a positive effect on skills as dribbling and throwing ball over hand through it.

Table1: The Subjects' Demographic Properties

Variables	Mean \pm Standard Deviation
Age (Year)	7.47 \pm 0.50
Height (Cm)	122.47 \pm 7.36
Weight (Kg)	25.73 \pm 5.13
Body Mass Index (Kg/m ²)	17.06 \pm 1.94

Table 2: Statistical Descriptions of Variables

Variables	Mean \pm Standard Deviation
Running	2.90 \pm 1.08
Trotting	2.69 \pm 1.06
Hoping	3.50 \pm 1.10
Bounding	2.31 \pm 0.80
Jumping	2.76 \pm 1.10
Skid	2.92 \pm 1.21
Movement	17.48 \pm 4.18
Striking	3.44 \pm 1.27
Dribbling	2.80 \pm 0.96
Hold	2.24 \pm 0.79
Kicking	2.90 \pm 1.02
Throwing ball overhand	2.72 \pm 1.13
under arm roll	2.81 \pm 1.17
Control	16.91 \pm 3.61

Table3: Summarizing the of linear regression for BMI effect on the running and putting clubs

Effect	Beta of non Standard	Standard Error	Beta of Standard	t-value	P-value
BMI on Running	0.589	0.297	0.273	1.979	0.048 *
BMI on Striking	0.185	0.91	0.283	2.039	0.045 *

*The mean difference is significant at the 0.05 level

DISCUSSION AND CONCLUSION

As previously mentioned the aim of the present research is to identify the relationship BMI and fundamental skills. These skills have been evaluated by testing two skills: locomotors skill (such as running, skipping, jumping, leaping, galloping and sliding) and object control skill (like putting clubs, dribbling, striking, kicking, throw ball over hand, and under arm roll). Therefore 90 pupils ranged by 7-8 years old had been chosen after several considerations and their BMI was measured then they performed fundamental motor skills. The results showed that the best of the fundamental skill performed by children are skipping and putting clubs. The boys who solely lived in Yazd city were chosen to participate in the research. It seems that according to the previous studies (as Gallaho 2004) cultural, racial, and economical issues dominated in this extent leads to such results. Of course this justification is not enough for the descriptive results of the research because the physiological factors in children might be effective alternative in that extent.

The important thing in this research in the present research is the kind of fundamental movement skill which children are able to do better and with high grad. The internal correlation of the movement alternatives showed the significant and positive internal correlation of skipping with galloping and ultimately galloping with running. In other words the subjects who had higher performance in skipping could perform better in acquisition of running skill. The kinds of skills mentioned above are classified in group of locomotors skills but the question is: What has the results of object control test brought for children?

The object control skill's test was tested and the results have shown that the children of 7-8 years old can acquire higher grades in putting clubs and kicking. Justifying that, we can refer to the subject's features that are 7-8 years old. The results of object control skill test were presented mainly in form of striking skills. Based on the results of internal correlation coefficient test of object control skill it can be concluded that learning and acquiring one of the mentioned skills ultimately lead to learning others. For

example putting clubs has a significant correlation with dribbling on the other hand dribbling leads to the increase of throwing ball over hand skill. The correlation between skills showed the extent in which learning fundamental motor skill are important and they lead to the activation of other skill. The results of the present research make this theory practical and indicated that improving the fundamental movements function depend upon a group of correlation fundamental skills.

The other purposes and as well challenges of the present research was that how BMI as interval alternatives with respect to the other effective alternatives brought different and contradictory results, can affect locomotors and object control skill. This challenge continually reported and to certain discuss over this issue the children of 7-8 years old have been evaluated , the correlation and the linear regression results showed that BMI merely has relationship with running (as a locomotors skill) and putting clubs (as object control skill). The present findings are coherent with the results of Zagroding and tomporowski (2007), hemayatyalab et al (2010), and siyahkoochian (2011) in relation with the BMI effect on fundamental motor skills and they are not coherent with the

research of Zandonodi et al (2007) and Frey and chow (2006) [5-7]

The reason for this incoherency might have a root in the subject's age .Graf et al had studied 668 German children of 6 to 7 years old [8]. They proved that obese children have got poor results in locomotors skill in comparison with the individuals who has natural weight or light weight. Likewise girls were biter than boys in performing fundamental motor skill. As a matter of fact, they observed the reversal relationship between BMI and performing fundamental motor skill of both boys and girls. Finally researchers suggested that overweight and obesity considered to be an important factor leads to poor function of person's movement skills. Therefore a combination of movement test and questionnaires can evaluate the children's movement ability more accurately. The reason why Graf's study is not coherent with the present research might be its focus on the independence alternatives in all spectrum of body type, that of studying merely the obese person. Also they did not use special questionnaires for children and their study was of a linear kind. In fact linear study can cause the increase of physical fitness by subject's growth that is an effective factor in improving fundamental motor skill (2012) furthermore the subject's numbers can

be another reason. obese children mainly have less movement range compared with individual who has natural weight for the sedentary life they are leading and they have fat mass that is a factor for their unsuccessfully performance of fundamental motor skill.

In addition to the above factor there are others like mental, social, and environmental scales that justify the present research contrast. what has been emphasized in previous studies was mental factors like intellect and the subjects were mentally handicapped .their age was above children so it can be said that the differences of the subject's feature, evaluation method, ability performance, and fundamental motor skill is the reason of this contradictory results, meanwhile some researchers reported a positive relationship between BMI and fundamental motor skill by studying people above 10 years old. But Zanodoni et al (2007) and Nerovick et al (2011) showed no significant relationship between these indexes by studying the children under 6 years old. by pondering, it seems that the results of present research and subjects age demonstrated the relationship between BMI and fundamental motor skill which is depend upon specific ages, in a way that BMI mainly has a positive and significant relationship with fundamental motor skill in the age of 7-8 years old (2009,

2011) above or under this ages it shown a specific changes in the kind of this relationship.

In addition, it seems that movement capacities and variance of testes are effective factor in observing contradictory results. For instance, some researchers utilized harmonic testes that evaluate speed, muscle power, and agility. Note that they repeated the tests (TMGD-harmony) in several stages it may affect the increase of subject's physical capability.

Regarding the fact that the dependable alternatives of this research (fundamental motor skill) included locomotors skills an object control skills, the fundamental motor skill are classified in the gross motor skills. That's why the, regard the present research, gross motor skills mainly have a significant relationship with BMI. It seems the reason for incoherency of this research compare with other is that it measured both gross skills and delicate skills. however by reviewing and comparing the previous studies and present research, it can be demonstrated that physiological, environmental, mental, anatomic, nutrition, social and economic factors may affect the children's BMI in basic ages and periods and sensitive stages of life which ultimately can affect the fundamental motor skill directly or indirectly .finally it is worst to be mentioned that most studies

considered obesity and overweight as an important and affective alternatives in fundamental motor skills function .they lead to poor functional movement that is the result of lack of attention to the children's spare time in most cases watching TV mass medias an malnutrition are important factor in increasing the children's BMI.

Thus the reduction of watching TV and correcting the nutritional habits along with forcing children to do physical activities can be consider as affective action to prevent obesity in children. Therefore an active lifestyle is suggested to be established at school and family's for children in primary stages of childhood since it affect significantly on doing physical activity and fundamental motor skill.

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